REMARKS

Claims 1-18, 20 and 22 are pending.

Applicants enclose a substitute specification herewith addressing most of the objections to the specification. Applicants respectfully disagree with the Examiner's objection to Figure 2 . The first sequence mentioned in Figure 2 (Co-CalDes) is disclosed in the sequence listing as SEQ ID NO: 2 (see the substitute specification, paragraph bridging pages 34 and 35 and the sequence listing). The other sequences are all in the public domain (see attached EMBL-EBI search results and the substitute specification, paragraph bridging pages 34 and 35).

Claims 6 and 7 stand rejected under 35 U.S.C. 101. Applicants have amended these claims to exclude humans.

Claims 1 and 4-14 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite. Applicants have amended the claims on the points noted by the Examiner. The Examiner's suggestions are appreciated. The amendment of "at least one" to "the" or "a" does not change the scope of the claim, but is simply made for clarity. The terms "functional" and "nonfunctional" are defined at the paragraph bridging pages 18 and 19 of the substitute specification. Support for the amendment at the end of claim 1 can be found at the paragraph bridging pages 9 and 10 of the substitute specification.

Claims 1 and 4-14 stand rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement and as lacking enablement.

Applicants respectfully traverse these rejections. Examples 4 and 5 of the present specification disclose the expression of the gene and the analysis of the lipids. In view of this disclosure, a person having ordinary skill in the art would be able to test other sequences for their enzymatic activity without undue experimentation, and thus would be able to practice the invention.

Claims 1 and 4-8 stand rejected under 35 U.S.C. 102(b) as being anticipated by Hitz (US 5,846,784). Claims 1 and 4-12 and 14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over DeBonte et al. (US 5,850,026) in view of Hitz. Applicants respectfully traverse these rejections.

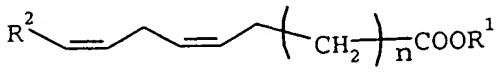
The applicants are claiming an isolated nucleic acid sequence which encodes a polypeptide with desaturase activity, selected from

a) a nucleic acid sequence with the sequence shown in SEQ ID NO: 1,

b) nucleic acid sequences which, as a result of the degeneracy of the genetic code, are derived from the nucleic acid sequence shown in SEQ ID NO: 1,

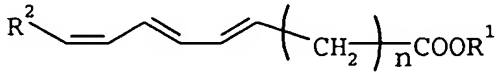
c) derivatives of the nucleic acid sequence shown in SEQ ID NO: 1 which encode polypeptides with the amino acid sequence shown in SEQ ID NO: 2 and which have at least 75% homology at amino acid level without substantially reducing the enzymatic activity of the polypeptides.

In particular, applicants are claiming an enzyme which converts a fatty acid of the structure I,



(I)

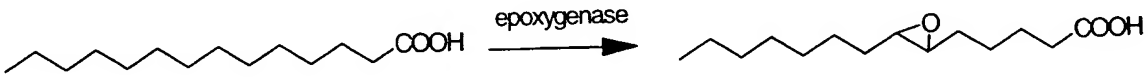
which has double bonds separated from each other by a methylene group, to give a triunsaturated fatty acid of the structure II



(II)

the three double bonds of the fatty acid being in conjugation and wherein the substituents and variables in the compounds of the structure I and II having the meaning disclosed in the substitute specification at page 20 et seq.

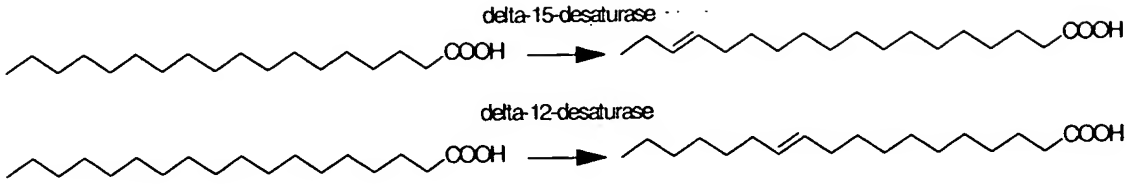
Hitz (WO 98/56922, claim 14 and page 4, lines 13 and 14) teaches a Δ-12-fatty acid epoxygenase (SEQ ID NO: 3) derived from plants and their nucleic acid sequence. This Δ-12-fatty acid epoxygenase introduces an epoxy group into fatty acid molecules as illustrated by the following reaction



In addition Hitz discloses a "normal" desaturase which introduces a double bond into a fatty acid molecule and therefore leads to unsaturated fatty acids. Hitz does not mention desaturase activity which leads to triunsaturated fatty acids.

DeBonte et al. (US 5,850,026, see column 2, lines 60 to 65) discloses a Δ-12-fatty acid desaturase. This desaturase introduces a double bond in the Δ-12-position of the fatty acid. In addition, DeBonte et al. (see column 2, lines 60 to 65) teaches a Δ-15-fatty acid desaturase which introduces a double bond in the Δ-15-position of the fatty

acid. The reactions are as follows:



Applicants are claiming, as mentioned above, a nucleic acid which encodes a polypeptide with desaturase activity. More specifically, applicants are claiming a desaturase, which introduces a double bond into a fatty acid molecule which already has two double bonds in the molecule so that conjugated triunsaturated fatty acids are synthesized. This is totally different from the activities disclosed by DeBonte et al.

Therefore, applicants urge that the cited references do not anticipate or render obvious the present invention.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11.0345. Please credit any excess fees to such deposit account.

Respectfully submitted,
KEIL & WEINKAUF

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Washington, D.C. 20036
(202) 659-0100

EBI **Dbfetch**

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RA   Sayanova O., Shewry P.R., Napier J.A.;
RT   "Fatty acid desaturases from borage";
RL   Unpublished.
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RA   Sayanova O., Shewry P.R., Napier J.A.;
RT   ;
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RL   Cell Biology, IACR-Long Ashton Research Station, Long Ashton, Bristol B
RL   9AF, UK
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RT   ;
RL   Submitted (13-AUG-1998) to the EMBL/GenBank/DDBJ databases.
RL   Cell Biology, IACR-Long Ashton Research Station, Long Ashton, Bristol B
RL   9AF, UK
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RA   Lee M.A.;
RT   ;
RL   Submitted (21-JAN-1998) to the EMBL/GenBank/DDBJ databases.
RL   M.A. Lee, Nilsson Ehle Laboratory, Sualof Webull Ab, S-26881, Svalov,
RL   SWEDEN
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RX   PUBMED; 9572738.
RA   Lee M., Lenman M., Banas A., Bafor M., Singh S., Schweizer M., Nilsson
RA   Liljenberg C., Dahlqvist A., Gummeson P., Sjoedahl S., Green A., Stymne
RT   "Identification of non-heme diiron proteins that catalyze triple bond a
RT   epoxy group formation.";
RL   Science 280(5365):915-918(1998).
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RP   1-1435
RA   Lee M.A.;
RT   ;
RL   Submitted (22-DEC-2000) to the EMBL/GenBank/DDBJ databases.
RL   M.A. Lee, Nilsson Ehle Laboratory, Sualof Webull Ab, S-26881, Svalov,
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RT   "Identification of non-heme diiron proteins that catalyze triple bond a
RT   epoxy group formation.";
RL   Science 280(5365):915-918(1998).
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RA   Lenman M.E.;
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RL   Submitted (21-JAN-1998) to the EMBL/GenBank/DDBJ databases.
RL   M.E. Lenman, Dept of Plant Breeding Research, SLU, Herman Ehles V 2-4,
RL   26831 Svalov, SWEDEN
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